REMARKS

By this amendment, the Abstract and claim 1 are revised, claims 8-14 are canceled, and arguments are made to place this application in condition for allowance. Currently, claims 1-7 are before the Examiner for consideration on their merits.

First, the Abstract is replaced with a new one that complies with the PTO requirement of 150 words or less.

Second, claim 1 has been revised to address the informalities noted in the Action. The informalities noted in claim 8 and its dependent claims are now moot given the cancellation of claims 8-14. By the revisions to claim 1, the claims are now definite and the rejection based on 35 USC §112, second paragraph, should be withdrawn.

Lastly, Applicants respectfully traverse the rejection of the claims. In review, the Examiner has made a number of rejections of the claims and these rejections as well as the traverse of the rejections are addressed below under their respective heading.

United States Patent No. 3,842,365 to Bibighaus

The Examiner alleges that claim 1 is anticipated by Bibighaus under 35 USC §102. Applicants respectfully traverse the rejection based on anticipation and Bibighaus. That is, Bibighaus does not teach each and every limitation of claim 1 and a prima facie case of anticipation cannot exist for this reason.

Bibighaus discloses a tube rolling mill. Referring to FIGS. 1 to 3, the rolling mill includes a roll housing 23. The roll housing 23 includes a front set of rolls 39, 41, and

43 shown in FIG. 2 and a rear set of rolls 45, 47, and 49 shown in FIG. 3. The rear set of rolls are disposed rearward of the front set of rolls, see FIG. 1.

Referring to FIG. 1, a mandrel 37 is inserted into a tube 33 to be rolled. The mandrel 37 is fixed to the rolling mill by means of a gripping device 36. The tube 33 is moved along the mandrel 37 by the device 38.

In the rolling mill of Bibighaus, the roll housing 23 and the cam housing 11 move relative to each other to roll the tube 33. Specifically, referring to FIG. 4, the rolls 39, 41, and 43 of the front set move up and down in the radial direction as the cam 39* moves between Al and I1. Similarly, the rolls 45, 47 and 49 of the rear set move up and down in the radial direction as the cam 45* moves between D2 and H2. Therefore, the tube 33 is rolled between B and J during one roll. In Bibighaus, the rolls **are not fixed** and can move freely up and down.

The caliber configurations of the rolls 39, 41, 43, 45, 47, and 49 of the front and rear sets are shown in FIG. 5. The groove bottom 81 forms an arc of a radius centered on point 83 (labeled "R"). Flanges 89 and 91 are tangential lines extending from edge points of the arc of the groove bottom.

The radius R of the groove bottom 81 of each of the rolls 45, 47, and 49 of the rear set is equal to or slightly smaller than the radius of the tube 33 in its final product configuration (which seems to be the radius of the tube 33 at location J in FIG 4.). The radius R of the groove bottom 81 of each of the rolls 39, 41, and 43 of the front set is larger than the radius of the tube 33 in its final product configuration, and is equal to the radius of the tube 33 at location F in FIG. 4, see column 7, lines 46 to 56.

Bibighaus does not describe the relationship between the claimed configuration of the front set of rolls and that of the rear set of rolls. More particularly, the differences between the subject matter of claim 1 and Bibighaus are as follows:

(A) The bottom of the groove of each of the rolls in the stands except the rearmost stand of claim 1 forms an arc with a radius centered on the rolling axis. On the contrary, though the groove bottom of each of the rolls of Bibighaus forms an arc, this groove bottom does not form a radius centered on the rolling axis. In summary, point 83 in FIG 5 of Bibighaus is **not** on the rolling axis.

(B) In each of the rolls of the subject matter, the distance between an edge of the groove and the rolling axis is larger than the radius of the bottom of the groove of each of the rolls contained in the previous stand. To the contrary, Bibighaus does not disclose this feature.

The subject matter is different from Bibighaus in (A) above. It is because the rolls of each stand do not move in the radial direction but are fixed in the radial direction so that the bottom of the groove of a roll forms an arc *centered on the rolling axis*. To the contrary, according to Bibighaus, rolling is performed by the rolls moving up and down, and the arc of the roll groove bottom is **not centered on the rolling axis**.

Further, the subject matter is different from Bibighaus in (B) above. As shown in FIG. 4 and described in column 7, lines 46 to 56, Bibighaus describes that the radius of the groove bottom of each of the rolls 39, 41, and 43 of the front set is larger than the radius of the groove bottom of each of the rolls 45, 47, and 49 of the rear set.

However, Bibighaus does not define any relationship between the distance between an edge of the groove, i.e. an edge of the roll flange, and the rolling axis to the groove bottom radius of the rolls of the front set.

The arguments above demonstrate that there are specific features of claim 1, which are not found in Bibighaus. Lacking these features, the allegation that Bibighaus anticipates claim 1 is error on the part of the Examiner and the rejection of the claims based on 35 USC §102 and Bibighaus must be withdrawn.

There is also no reason to reject the claims under 35 USC §103 based on Bibighaus. The reason for this is that the subject matter minimizes polygon formation, edge marks, and overfilling by including the configurations according to the differences (A) and (B) above. On the contrary, Bibighaus does not disclose nor suggest such a problem. Thus, there would be no reason to modify Bibighaus so as to arrive at the invention without using Applicants' invention as a teaching template.

For the reasons given above, the subject matter of claim 1 is neither anticipated nor rendered obvious over Bibighaus. The dependent claims are also patentable over this reference given that claim 1 is patentable.

JP 04 158907 to Yamamoto et al. (Yamamoto)

The Examiner alleges that claim 1 is anticipated by Yamamoto under 35 USC §102. Applicants also traverse this rejection on the grounds that Yamamoto does not teach each and every feature of claim 1.

Yamamoto discloses a continuous tube reducing mill capable of producing a tube with an excellent inner surface configuration, see page 40, bottom-left column, lines 1 to 5 of Yamamoto. The reducing mill uses two types of rolls. More particularly, type (I) as shown in FIG. 1, with one roll stand having a caliber designed such that the tube reduction is largest at the middle between the center of the roll groove bottom and a roll edge is combined in series with type (II), with two roll stands having a caliber designed such that the tube reduction is largest at the center of the roll groove bottom and smallest at a roll edge, as shown in FIG 4, to form one set of rolls, see page 41, bottom-left column.

Further, Yamamoto on page 41, bottom-right column, discloses that, in the roll of type (I), given that the distance between the rolling pass line and the center of the roll groove bottom is represented by a, the distance between the rolling pass line and a roll edge is represented by b, and the distance between the rolling pass line and at least one arbitrary point between the center of the roll groove and a roll edge is represented by c, $c<a<b$, $c<b<a$, or $c<a=b$ is satisfied.

Yamamoto describes that the use of the set of rolls above produces a tube with a truly circular inner surface, thereby improving the configuration of the inner surface, see page 42, bottom left column. The subject matter of claim 1 is different from Yamamoto in the following point:

(C) In the rolls of the subject matter, the distance between an edge of the groove and the rolling axis is larger than the radius of the bottom of the groove of each

of the rolls contained in the previous stand. To the contrary, Yamamoto does not disclose this feature.

To reiterate, Yamamoto does not describe any relationship between the groove (caliber) configuration of the rolls of the previous stand and the groove configuration of the rolls of the subsequent stand. Therefore, the subject matter is novel over Yamamoto.

Although Yamamoto discusses polygon formation, Yamamoto does not disclose nor suggest edge marks nor overfilling. Therefore, Yamamoto does not disclose nor suggest the difference (C) noted above. Therefore, one of skill in the art cannot get to the invention using Yamamoto and a prima facie case of obviousness is not established by the teachings of this prior art.

JP 06-210318 to Kuroda et al. (Kuroda)

The Examiner alleges that claim 1 is anticipated by Kuroda under 35 USC §102. As with the prior two rejections, Applicants submit that the Examiner has erred in making this rejection.

Referring to FIG. 4 of Kuroda, in the roll i of the ith stand, the distance between the center of the hole-shape O through which the pass line extends and the groove center Qi of the roll i is represented by bi. The distance between the center of the hole-shape O and the middle point Pi of a roll gap is represented by a_i. Then, $a_i > b_i$ and $a_i - b_{i-1} < 0$ are satisfied. Kuroda describes that b_i-1 is the radius of the groove bottom of the roll i-1, which precedes the roll i. In paragraph [0027], Kuroda describes that

disposing rolls of such a configuration minimizes overfilling of a tube and unevenness in thickness.

The difference between the subject matter of claim 1 and Kuroda is as follows:

(D) In each of the rolls of the subject matter, the distance between an edge of the groove and the rolling axis is longer than the radius of the bottom of the groove of each of the rolls contained in the previous stand. On the contrary, Kuroda provides a_i-b_{i-1}<0, which is the opposite of the relationship in the subject matter of claim 1. As such, Kuroda cannot anticipate claim 1 for this reason.

In addition, there is no basis for the Examiner to allege that a prima facie case of obviousness can be made out using Kuroda. As noted above, Kuroda teaches the opposite relationship found in claim 1 and one of skill in the art would have no reason to reverse this relationship absent knowing the invention ahead of time.

SUMMARY

The rejections of claim 1 are not valid since the features of this claim are not found in any of the prior art cited by the Examiner. Moreover, there is no reasoning that this prior art could be further modified so as to arrive at the invention. Therefore, claim 1 and its dependent claims are patentable over the cited prior art.

Accordingly, the Examiner is requested to examine this application and pass all pending claims onto issuance.

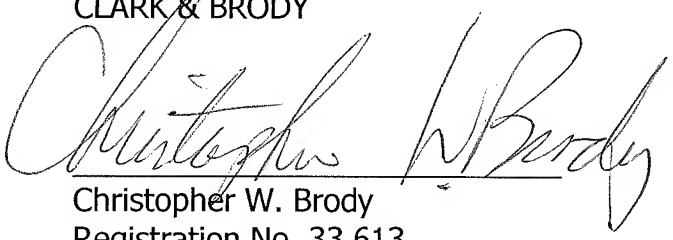
If the Examiner believes that an interview would be helpful in expediting the allowance of this application, the Examiner is requested to telephone the undersigned at 202-835-1753.

The above constitutes a complete response to all of the outstanding issues raised in the Office Action.

Again, reconsideration and allowance of this application are requested.

Applicants respectfully submit that there is no fee required for this submission, however, please charge any fee deficiency or credit any overpayment to Deposit Account No. 50-1088.

Respectfully submitted,
CLARK & BRODY



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